

Question 30:

0.5 g mixture of $K_2Cr_2O_7$ and $KMnO_4$ was treated with excess of KI in acidic medium. Iodine liberated required 100 cm³ of 0.15 M sodium thiosulphate solution for titration. The percent amount of $KMnO_4$ in the mixture is

Atomic weight-K=39, Cr=52, Mn=55, Na=23, S=32

Let 'a' g of $K_2Cr_2O_7$ be present in the mixture.

Mass of $KMnO_4$ = (0.5-a) g

Eq. mass of $K_2Cr_2O_7$ = Molecular mass /6

$$= 294/6 = 49.0$$

Eq. mass of $KMnO_4$ = Molecular mass /5

$$= 158/5 = 31.6$$

No. of equivalents of $K_2Cr_2O_7$ = $a/49.0$

No. of equivalents of $KMnO_4$ = $(0.5-a)/31.6$

No. of equivalents of $Na_2S_2O_3$ in 100 cm³ of 0.15 M solution

$$=(100 \times 0.15)/100$$

$$=0.015$$

Equivalents of $K_2Cr_2O_7$ + Equivalents of $KMnO_4$

=Equivalents of iodine

= Equivalents of $Na_2S_2O_3$

$$49.0a + 31.6(0.5-a) = 0.015$$

$$17.4a = 1.274$$

$$a = 0.0732$$

$$\% \text{ of } KMnO_4 = 85.36$$